

5.4 Greenhouse Gas Emissions

Information in this section is summarized from the *Greenhouse Gas Study for Dos Colinas Project*, prepared by Rincon Consultants, Inc. (July 2010). This document is provided as Appendix C2 on the attached CD of Technical Appendices found on the back cover of this EIR.

5.4.1 Existing Conditions

5.4.1.1 Global Climate Change

Global Climate Change (GCC) is a change in the average weather of the earth that is measured by temperature, wind patterns, precipitation, and storms over a long period of time. The baseline, against which these changes are measured, originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed an unprecedented acceleration in the rate of warming during the past 150 years. GCC is a documented effect. Although the degree to which the change is caused by anthropogenic (man-made) sources is still under study, the increase in warming has coincided with the global industrial revolution, which has seen the widespread reduction of forests to accommodate urban centers, agriculture, and the use of fossil fuels – primarily the burning of coal, oil, and natural gas for energy. The majority of scientists agree that anthropogenic sources are a main, if not primary, contributor to the GCC warming.

5.4.1.2 Greenhouse Gases

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHG), in reference to the fact that greenhouses retain heat. Common GHGs include water vapor, carbon dioxide (CO₂), water vapor, methane (CH₄), nitrous oxide (N₂O), fluorinated gases, and ozone (O₃). Of these gases, CO₂ and CH₄ are emitted in the greatest quantities from human activities. Emissions of CO₂ are largely by-products of fossil fuel combustion, whereas CH₄ results from off-gassing associated with agricultural practices and landfills. Man-made GHGs, many of which have greater heat-absorption potential than CO₂, include fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

The accumulation of GHG in the atmosphere regulates Earth's temperature. Without the natural heat trapping effect of GHG, Earth's surface would be about 34° C cooler. However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. A detailed discussion of the primary GHGs of concern and the effects of GCC on the environment is provided in the *Greenhouse Gas Study* (Appendix C2 of this EIR).

4.3.1.3 Regulations

A. International and Federal Regulations

To date, the United States Environmental Protection Agency (USEPA) has not regulated GHGs under the Clean Air Act; however, the U.S. Supreme Court in *Massachusetts v. EPA* (April 2, 2007) held that the USEPA can, and should, consider regulating motor-vehicle GHG emissions. On June 30, 2009, the USEPA granted California's request for a waiver to directly limit GHG tailpipe emissions for new motor vehicles beginning with the current model year. On December 7, 2009, the USEPA determined that emissions of GHGs contribute to air pollution that "endangers public health and welfare" within the meaning of the Clean Air Act. This action finalizes the USEPA's "endangerment determination" initially proposed on April 17, 2009, and now obligates the USEPA to regulate GHG emissions from new motor vehicles. This finding sets the stage for the inevitable regulation under the Clean Air Act of GHG emissions from a wide range of stationary and mobile sources unless Congress preempts such regulation by enacting climate change legislation. Although the USEPA has not yet promulgated federal regulations limiting GHG emissions, further action is pending.

B. California Regulations

Assembly Bill (AB) 1493, requiring the development and adoption of regulations to achieve "the maximum feasible reduction of greenhouse gases" emitted by noncommercial passenger vehicles, light duty trucks, and other vehicles used primarily for personal transportation, was signed into law in September 2002. In 2005, Executive Order S-3-05 established statewide GHG emissions reduction targets. S-3-05 provides that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and, by 2050, emissions shall be reduced to 80% of 1990 levels. In response to S-3-05, CalEPA created the Climate Action Team, which in March 2006 published the Climate Action Team Report. This report identified a recommended list of strategies that the state could pursue to reduce GHG emissions.

AB 32, the "California Global Warming Act of 2006," was signed into law in the fall of 2006. AB 32 required the California Air Resources Board (CARB) to adopt regulations to require reporting and verification of statewide GHG emissions. The CARB was required to produce a plan by January 1, 2009 to indicate how emission reductions will be achieved from major GHG sources via regulations, market mechanisms, and other actions. In addition, this law requires the CARB to adopt regulations by January 1, 2010 to implement the early action GHG emission reduction measures that can be implemented before the adoption of those recommended by the 2009 plan. The bill requires achievement by 2020 of a statewide GHG emissions limit equivalent to 1990 emissions (essentially a 25% reduction below 2005 emission levels; the same requirement as under S-3-05), and the adoption of rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emissions reductions.

In response to the requirements of AB 32, the CARB produced a list of 37 early actions for reducing GHG emissions in June 2007. The CARB expanded this list in October 2007 to 44 measures that have the potential to reduce GHG emissions by at least 42 million metric tons of CO₂ emissions by 2020, representing about 25% of the estimated reductions needed by 2020.

Senate Bill (SB) 97, signed in August 2007, acknowledges that GCC is an environmental issue that requires analysis under CEQA. In December 2009, the California Resources Agency adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and GCC impacts.

B. Local Regulations and CEQA Requirements

Quantitative significance thresholds for GCC have not been adopted by the State of California, the City of Carlsbad or any particular air pollution control district, including the San Diego County Air Pollution Control District. Pursuant to the requirements of SB 97, the Resources Agency adopted amendments to the State Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted CEQA Guidelines provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and GCC impacts. In 2009, the CEQA Guidelines were amended to include new thresholds for GHG emissions. These thresholds are provided in the following section.

5.4.2 Impact Threshold

Appendix G of the CEQA Guidelines is used to provide direction for determination of a significant greenhouse gas emissions impact from the proposed project. For purposes of this EIR, a significant greenhouse gas impact would occur if implementation of the proposed project would:

- *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or,*
- *Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.*

5.4.2.1 The California Global Warming Solutions Act (AB 32)

In September 2006, the California AB 32, the global warming bill, was signed into law. AB 32 directs the CARB to do the following:

- 1) Establish a statewide greenhouse gas emissions cap for 2020, based on 1990 emissions by January 1, 2008.
- 2) Adopt mandatory reporting rules for significant sources of greenhouse gases by January 1, 2009.
- 3) Adopt a plan by January 1, 2009 indicating how emission reductions will be achieved from significant greenhouse gas sources via regulations, market mechanisms and other actions.
- 4) Adopt regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas, including provisions for using both market mechanisms and alternative compliance mechanisms.
- 5) Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee to advise CARB.

- 6) Ensure public notice and opportunity for comment for all CARB actions.
- 7) Prior to imposing any mandates or authorizing market mechanisms, CARB must evaluate several factors, including but not limited to, impacts on California's economy, the environment and public health; equity between regulated entities; electricity reliability; conformance with other environmental laws; and that the rules do not disproportionately impact low-income communities.

5.4.2.2 *The California Air Pollution Control Officers Association (CAPCOA) Recommended CO₂ Screening Levels*

CAPCOA and CARB currently publish CO₂ screening levels for use in CEQA reporting. The screening level is set at 900 metric tons of CO₂ per year and is 'recommended' for all new projects within the State of California for compliance with the intent of AB 32. Operational levels due to a proposed project action above the 900 MT screening value will be subject to additional recommendations for compliance. For example, if a project's estimated CO₂ emissions exceed the 900 metric ton screening threshold, then mitigation measures would be recommended in order for the project to achieve a reduction of CO₂ emissions by approximately 28 percent as compared to "business-as-usual" scenario.

5.4.3 Impact

5.4.3.1 *Methodology*

The analysis in the Greenhouse Gas Study (Appendix C2 of this EIR) provided a comparison of the GHG emissions of the proposed project and a "business-as-usual" approach to development, two different scenarios were modeled. The first scenario, the business-as-usual approach, determines the GHG emissions that would be generated if the project site was developed similarly to the proposed project (338 residential units including 309 senior housing units and 29 affordable multi-family housing units) but without the proposed project's features designed to reduce emissions (i.e., Transportation Demand Measures (TDM), installation of solar energy equipment (i.e. the proposed Thermal Cogeneration system), and low water use features). The second scenario analyzes the proposed project and also incorporated the project-specific amenities. These include Transportation Demand Measures, building energy efficiency measures, energy efficient appliances, geothermal heat pumps, low-flow plumbing features, drought tolerant landscaping and irrigation controls to assure water efficiency, and the installation of the Thermal Cogeneration system for the project. The business-as-usual scenario and the proposed project used in GHG emission modeling are provided in Table 1 of the Greenhouse Gas Study (Appendix C2 of this EIR).

5.4.3.2 *Estimate of GHG Emissions*

A. Operational Indirect and Stationary Direct Emissions

Operation of on-site development would consume an estimated 2,366,000 kilowatt-hours [kWh]/year of electricity for the business-as-usual scenario and an estimated 2,011,100 kWh/year of electricity for the proposed project (Table 5.4-1).

TABLE 5.4-1
Estimated Electricity Consumption

Type of Use	Amount (residential units)	Electricity Demand Factor	Annual Electricity Demand (kWH)
Business-as-Usual Scenario	338	7,000 kWH/residential unit/year*	2,366,000
Proposed Project	338	5,950 kWH/residential unit/year**	2,011,100
Difference:			354,900 decrease

Notes: kWH= kilowatt hour,

*=Demand factor from CAPCOA, January 2008. CEQA and Climate Change.

**=Demand factor from CAPCOA with 15% reduction for achieving energy conservation beyond Title 24 Standards.

Source: Rincon Consultants, Inc., 2010.

As shown in Table 5.4-1, although the overall size of the residential component would be the same for both the proposed project and the business-as-usual scenario, the proposed project would incorporate energy conservation beyond Title 24 energy standard requirements which is assumed to achieve at least a 15% energy savings. With this energy savings, the proposed project's annual electricity demand would be approximately 354,900 kWh/year less electricity than the business-as-usual scenario.

The generation of electricity through combustion of fossil fuels typically yields CO₂, and to a smaller extent, N₂O and CH₄. Annual electricity emissions were calculated using the California Climate Action Registry General Reporting Protocol, which has developed emission factors based on the mix of fossil-fueled generation plants, hydroelectric power generation, nuclear power generation, and alternative energy sources associated with the regional grid. CO₂ emission estimates based on URBEMIS model also take into account emissions from other operational sources such as natural gas for space heating.

Table 5.4-2 provides the operational emissions of GHGs associated with on-site electricity consumption and other operational sources for the business-as-usual scenario and the proposed project. As shown in Table 5.4-2, the business-as-usual scenario would result in 1,564 metric tons of Carbon Dioxide Equivalent (CDE) associated with operational sources. With emissions reductions as a result of design features and project mitigation, the proposed project would generate an estimated 183 metric tons of CDE.

B. Transportation Emissions

The business-as-usual scenario would generate approximately 11,016 daily vehicle miles traveled (VMT). The proposed project would generate approximately 11,016 daily VMT and also incorporates Transportation Demand Measures (TDM) that reduce emissions, including dedicating a daily shuttle, providing on-site bike parking, providing information about transportation alternatives, and providing carpool/vanpool parking spaces. These TDM measures are required by Mitigation Measures GHG-1 (for construction workforce) and GHG-2.

TABLE 5.4-2
Estimated Annual Operational Emissions of Greenhouse Gases

Emission Source	Annual Emissions	
	Emissions	Carbon Dioxide Equivalent (CDE)
Business-As- Usual Scenario		
Carbon Dioxide (CO ₂) ¹	1,720 (short tons, US)	1,560 metric tons
Methane (CH ₄) ²	0.03 metric tons	1 metric tons
Nitrous Oxide (N ₂ O) ²	0.009 metric tons	3 metric tons
Business-As-Usual Total		1,564 metric tons
Proposed Project		
Carbon Dioxide (CO ₂) ¹	1,462 (short tons, US)	1,327 metric tons
Methane (CH ₄) ²	0.03 metric tons	1 metric tons
Nitrous Oxide (N ₂ O) ²	0.007 metric tons	2 metric tons
Emissions Reductions from Proposed Design Features ³		(1,147 metric tons)
Proposed Project Total		183 metric tons

Notes: 1 See Appendix for calculations and GHG emission factor assumptions

2 California Climate Action Registry General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, Version 2.2, March 2007, page 30-35.

3 Reductions are based on project specific design features and calculated using ICLEI's CAPPA GHG reduction modeling tool. See the Appendix for the Emissions Reduction Worksheet associated with the proposed design features.

Source: Rincon Consultants, Inc., 2010.

Table 5.4-3 provides the estimated mobile emissions of GHGs for the business-as-usual scenario and the proposed project. As shown in Table 5.4-3, the business-as-usual scenario would result in 1,385 metric tons of CDE units associated with mobile emissions. The proposed project would result in 1,368 metric tons of CDE units, or approximately 17 fewer metric tons of CDE units than the business-as-usual scenario.

C. Combined Stationary and Mobile Source Emissions

Table 5.4-4 combines the operational and mobile GHG emissions associated with on-site development for both the business-as-usual scenario and the proposed project. For the business-as-usual scenario, the combined annual emissions would total approximately 2,949 metric tons per year in CDE units. This total represents roughly 0.00059% of California's total 2004 emissions of 492 million metric tons. These emission projections indicate that the majority of the business-as-usual GHG emissions associated with operations include energy use (53%), while emissions associated with mobile sources account for approximately 47% of the overall GHG emissions.

For the proposed project, the combined annual emissions would total approximately 1,551 metric tons per year in CDE units. This total represents roughly 0.00032% of California's total 2004 emissions of 492 million metric tons. These emission projections indicate that the majority of the project GHG emissions are associated with mobile sources (88%), while emissions associated with operations including energy use account for approximately 12% of the overall GHG emissions.

The proposed project's contribution of approximately 1,551 metric tons CDE/year would exceed the 900-ton quantitative threshold suggested by CAPCOA provided in Table 6 of the Greenhouse Gas Study (Appendix C2 of this EIR), but would not exceed the other four thresholds.

TABLE 5.4-3
Estimated Annual Mobile Emissions of Greenhouse Gases

Emission Source	Annual Emissions	
	Emissions	Carbon Dioxide Equivalent (CDE)
Business-As- Usual Scenario		
Carbon Dioxide (CO ₂)	1,444 (short, US)	1,310 metric tons
Methane (CH ₄)	0.2 metric tons	4 metric tons
Nitrous Oxide (N ₂ O)	0.23 metric tons	71 metric tons
	Business-As-Usual Total	1,385 metric tons
Proposed Project		
Carbon Dioxide (CO ₂)	1,425 (short, US)	1,293 metric tons
Methane (CH ₄)	0.2 metric tons	4 metric tons
Nitrous Oxide (N ₂ O)	0.23 metric tons	71 metric tons
	Proposed Project Total	1,368 metric tons

Source: Rincon Consultants, Inc., 2010.

TABLE 5.4-4
Combined Annual Emissions of Greenhouse Gases

Emissions Source	Annual Emissions
Business-As-Usual	
Operational	1,564 metric tons CDE
Mobile	1,385 metric tons CDE
Project Total	2,949 metric tons CDE
Proposed Project	
Operational	183 metric tons CDE
Mobile	1,368 metric tons CDE
Project Total	1,551 metric tons CDE

Source: Rincon Consultants, Inc., 2010.

Because emissions exceed the 900-ton quantitative threshold, specific design features and measures required by Mitigation Measures GHG-1 and GHG-2 will be incorporated into the project design and operations. These measures, in conjunction with project design features, would reduce GHG emissions by approximately 1,398 metric tons CDE/year or approximately 47% compared to the business-as-usual scenario. Measures to reduce GHG are incorporated into the project and required by proposed mitigation. These measures include providing a mix of uses (residential units and approximately 180 jobs), locating housing in close proximity to existing retail, public transportation and bicycle routes, providing affordable housing units, and providing senior housing which generally yields fewer average daily trips than single-family housing. Also, Transportation Demand Measures would be implemented, as well as building energy efficiency measures, energy efficient appliances, geothermal heat pumps, low-flow plumbing features, drought tolerant landscaping and irrigation controls to assure water efficiency, and the installation of a Thermal Cogeneration system.

In the absence of specific federal, state, or local thresholds, if a project reduces emissions by more than approximately 28.3% (the statewide average that is commonly acceptable), impacts are not considered cumulatively considerable. Because the proposed project would reduce greenhouse gases by

approximately 47% compared to business-as-usual scenario, the proposed project would not result in significant impacts related to greenhouse gases. Therefore, the proposed project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Also, the project would be consistent with the GHG reduction goals of AB 32 by incorporating measures that reduce emissions by approximately 47% (which exceeds the AB 32 goal of approximately 28.3%); therefore, the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. As discussed in detail in the Greenhouse Gas Study (Appendix C2 of this EIR), the proposed project would be consistent with all of the CAT strategies and the 2008 Attorney General Greenhouse Gas Reduction Measures that are applicable to the proposed project, as well as Office of Planning and Research (OPR) strategies. As with all projects in California, the proposed project would be required to be consistent with the requirements of AB 32, with the implementation of proposed project features, and Mitigation Measures GHG-1 and GHG-2, the proposed project would comply with AB 32 and impacts related to GHG emissions will be less than significant.

5.4.4 Mitigation Measures

The following mitigation measures have been identified to reduce greenhouse gas emissions impacts and ensure compliance with AB 32 for the proposed project:

Construction Measures

GHG-1 Prior to the issuance of a grading permit for any phase of project development, the proposed project shall demonstrate that the following greenhouse gas offset measures have been implemented, or will be implemented during construction activities.

The Diesel Equipment (Compression Ignition) offset Strategies (40% to 60% Reduction):

1. Electricity from power poles shall be used rather than temporary diesel power generators.
2. Construction equipment operating onsite shall be equipped with two to four degree engine timing retard or precombustion chamber engines.
3. Scraper equipment shall meet the "Blue Sky Series" equivalent standard (reference Mitigation Measure AQ-2 in Section 5.3-Air Quality.)
4. Other construction equipment used for the project shall utilize EPA Tier 2 or better engine technology.

Vehicular Trip (Spark Ignition) Offset Strategies (30% to 70% Reduction):

1. Commute alternatives shall be encouraged by informing construction employees and customers about transportation options for reaching your location (i.e. post transit schedules/routes).
2. Construction vehicles shall be kept well maintained to prevent leaks and minimize emissions.

Operational Measures

GHG-2 Prior to the issuance of a building permit for any habitable structure, the Applicant shall demonstrate compliance with the following measures. These measures shall be shown on the building plans for each component of the project (i.e., affordable housing building, IL and AL buildings, cottages), to ensure that the features will be incorporated into the project. Verification of compliance can be accomplished as part of City inspection of buildings prior to issuance of certificate of occupancy.

On-site Energy Offset Strategies (50% to 70% Reduction):

1. All new structures shall meet California Code of Regulations Title 24 part 6: California's Energy Efficiency Standards.
2. All new structures shall use compact fluorescent lights.
4. Dimmable ballasts to dim lights to take advantage of daylight shall be installed.
5. A programmable thermostat shall be installed in all habitable units to control heating and air conditioning.
6. All major hot water pipes shall be insulated.
7. Refrigeration cold suction lines shall be insulated.
8. Weather stripping shall be used to close air gaps around doors and windows.
9. Electrical equipment, including all appliances shall be Energy Star compliant.
10. Ceiling fans shall be installed in the cottages and affordable housing units.

5.4.5 Impact After Mitigation

The proposed project incorporates various design features that are consistent with the CAT strategies and greenhouse gas reduction measures and strategies identified by the California Attorney General and the Governor's Office of Planning and Research. Additionally, the project will be required to implement Mitigation Measures GHG-1 and GHG-2, which, in combination with project design features, would reduce the project's impact associated with the generation of greenhouse gas emissions and contribution to climate change to a level less than significant. Together, these project design features and mitigation measures will reduce the greenhouse gas emissions associated with the proposed project by approximately 47 percent as compared to the business as usual scenario.

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